Estrogen Status Alters Tissue Distribution and Metabolism of Oral Dose of ^{75}Se-Selenite

Xiaodong Zhou, Anne M. Smith, and Mark Failla

Department of Human Nutrition, The Ohio State University

ABSTRACT

An association between male and female sex hormones and selenium (Se) status has been reported in animals and humans. These relationships may be important relative to the use of selenium in hormone related diseases such as breast cancer. The purpose of this study is to examine the effect of estrogen status on the absorption, tissue distribution and metabolism of Se. 60 µCi of ^{75}Se as selenite was orally administered to bilaterally ovariectomized rats 5 weeks after implantation of either placebo pellet (-E) or pellet with estradiol (+E). Blood and tissues were collected 1, 3, 6, and 24 h after dosing. Although absorption of ^{75}Se was independent of E status, ^{75}Se activity differed (P<0.05) in blood, liver, heart, kidney, spleen, brain, and thymus at certain times. For example, total ^{75}Se activity in liver was greater in -E than in +E rats after 1 hour (13.1% vs. 3.9% of total dose). However, +E group had greater ^{75}Se in liver after 6 h than -E group (18.0% vs. 10.9%). The relative distribution of ^{75}Se between cytosol and membrane fractions in tissues was independent of E status. Nor it affected the relative distribution of ^{75}Se among the selenoproteins in cytosol of the above tissues and plasma. However, larger percent of ^{75}Se was incorporated into selenoprotein P (SeP) and glutathione peroxidase (GPx) in plasma in +E group at 3, 6 and 24 h compared to -E group (P<0.05). These results suggest that the effects of estrogen status on selenium distribution among tissues are tissue specific and time-dependent. (Supported by the OARDC Grant OHO00201).

INTRODUCTION

•Selenium (Se) is an essential nutrient.

•Relationships between gender/sex hormones and selenium status have been observed in animals and humans.

•Preliminary findings from our laboratory strongly support a relationship between selenium metabolism and estrogen status.

•We hypothesize that the estrogen status will affect metabolism of ingested Se.

•The objective of this study is to examine the effect of estrogen status on the absorption, tissue distribution and metabolism of Se in a rat model.

•The results of this study are important when making recommendations about Se supplementation to people with hormone related diseases such as breast cancer.

ACKNOWLEDGEMENTS

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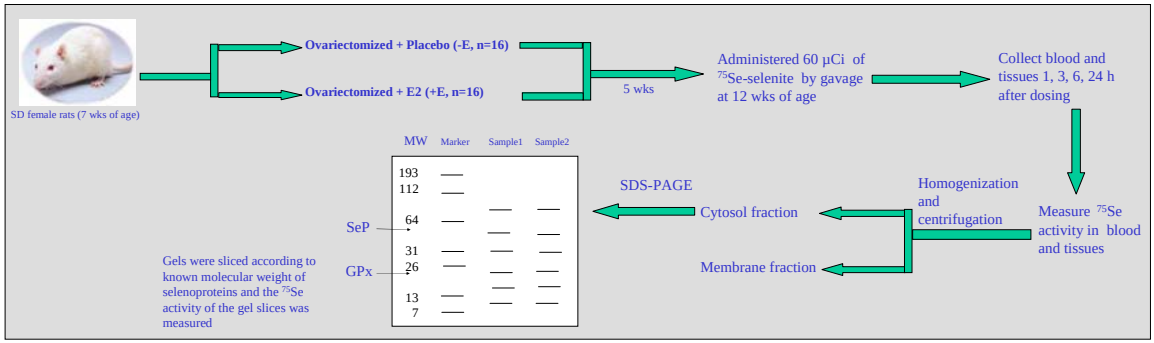
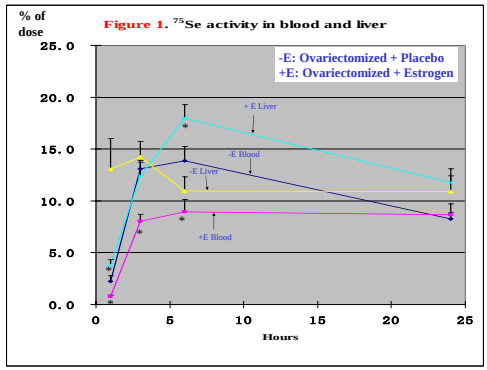
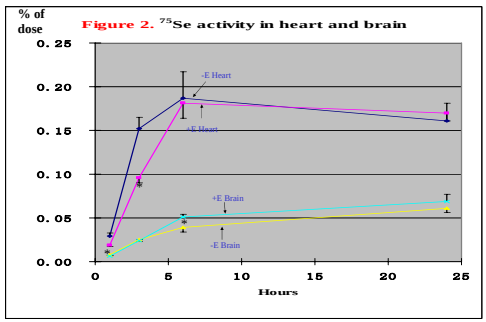
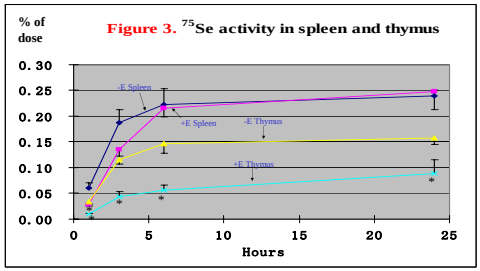
METHODS

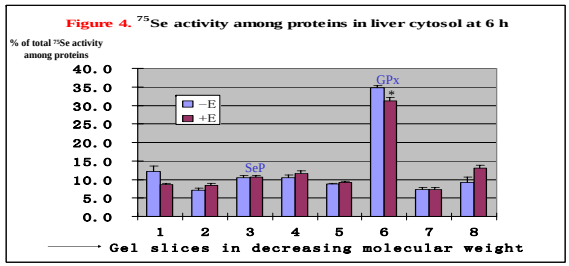


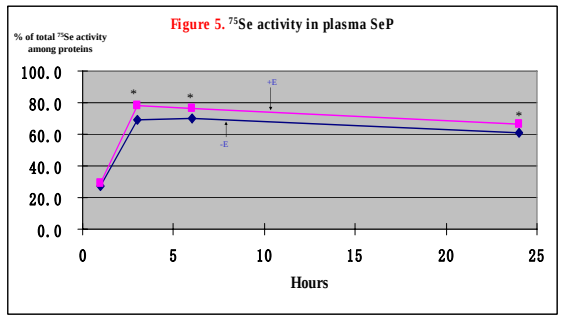
RESULTS











* P<0.05 for a t-test between -E and +E group in figures 1-5

CONCLUSIONS

•Estrogen triggers ^{75}Se transported into liver from 1 to 6 hour, and facilitated ^{75}Se distribution into other tissues from the liver after 6 hour. This suggests that estrogen could affect Se distribution among tissues by affecting Se metabolism in liver.

•The decrease in plasma SeP from 6 to 24 h suggests that SeP was delivering ^{75}Se to other tissues.

•Estrogen affected Se distribution among some tissues in a time-dependent manner.

•The mechanisms by which estrogen affects the Se metabolism remains to be elucidated.

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